

IN THE CLAIMS:

Please cancel claims 1-18 without prejudice or disclaimer, and substitute new Claims 19-36 therefor as follows:

Claims 1-18 (Cancelled).

19. (New) A method of performing digital beam forming on the radiation pattern of an array antenna comprising a plurality of antenna elements, each antenna element being coupled to a signal processing chain, comprising a weighting phase in which at least a complex weight coefficient is applied to a digital signal in a corresponding signal processing chain, said digital signal being an intermediate frequency digital signal, and said weighting phase comprising the following steps:

a) duplicating said digital signal into a first and a second digital signal;
b) processing said first and second digital signals by:
multiplying said first and second digital signals respectively by a real and an imaginary part of said complex weight coefficient;

applying a Hilbert transform to that signal which is multiplied by the imaginary part of said complex weight coefficient; and

c) combining said processed first and second digital signals into a weighted digital intermediate frequency signal by subtracting said second signal from said first signal.

20. (New) The method according to claim 19, wherein said step of applying the Hilbert transform is performed before said step of multiplying said first and second digital signals by the real and imaginary parts of said complex weight coefficient.

21. (New) The method according to claim 19, wherein said processing step comprises:

delaying said first signal, which is multiplied by the real part of said complex weight coefficient, by a predetermined time, in order to maintain such signal temporarily aligned with said second signal.

22. (New) The method according to claim 21, wherein said step of applying a Hilbert transform to said second signal and said step of delaying said first signal are performed commonly to a plurality of intermediate frequency digital signals parallelly processed in corresponding signal processing chains.

23. (New) The method according to claim 22, wherein said step of multiplying said first and second digital signals respectively by a real and an imaginary part of said complex weight coefficient is performed independently on the signal processing chain of each antenna element using a corresponding weight coefficient.

24. (New) A system for performing digital beam forming on the radiation pattern of an array antenna, said array antenna comprising a plurality of antenna elements, each antenna element being adapted for coupling to a signal processing chain suitable for applying to a digital signal at least a corresponding complex weight coefficient, said digital signal being an intermediate frequency digital signal comprising:

a first signal processing sub-chain operating on said intermediate frequency digital signal comprising a first multiplier for multiplying said intermediate frequency digital signal by a real part of said complex weight coefficient;

a second signal processing sub-chain operating in parallel with said first signal processing subchain on said intermediate frequency digital signal, comprising:

a Hilbert transform block for applying a Hilbert transform to said intermediate frequency digital signal;

a second multiplier for multiplying said intermediate frequency digital signal by an imaginary part of said complex weight coefficient, said Hilbert transform block and said second multiplier operating in cascade on said intermediate frequency digital signal; and

a subtracter for subtracting the signal processed by said second signal processing sub-chain from the signal processed by said first signal processing sub-chain, thus obtaining a weighted digital intermediate frequency signal.

25. (New) The system according to claim 24, wherein said Hilbert transform block processes said intermediate frequency digital signal before the same signal reaches said second multiplier.

26. (New) The system according to claim 24, wherein said second multiplier processes said intermediate frequency digital signal before the same signal reaches said Hilbert transform block.

27. (New) The system according to claim 24, wherein said first signal processing sub-chain further comprises a delay block operating in cascade with said first multiplier on said intermediate frequency digital signal.

28. (New) The system according to claim 27, wherein said delay block processes said intermediate frequency digital signal before the same signal reaches said first multiplier.

29. (New) The system according to claim 27, wherein said first multiplier processes said intermediate frequency digital signal before the same signal reaches said delay block.

30. (New) The system according to claim 27, comprising a down-link beam forming module comprising:

- a Hilbert transform block shared among a plurality of second signal processing sub-chains;

- a delay block shared among a plurality of first signal processing sub-chains;

- a splitter for replicating output signals from said Hilbert transform block and said delay block and for feeding corresponding first and second multipliers in said plurality of first and second signal processing subchains; and

- a plurality of subtracters for subtracting the signal processed by each second signal processing sub-chain from the signal processed by a corresponding first signal processing sub-chain, thus obtaining a weighted digital intermediate frequency signal.

31. (New) The system according to claim 27, comprising an up-link beam forming module comprising:

- a Hilbert transform block shared among a plurality of second signal processing sub-chains;

- a delay block shared among a plurality of first signal processing sub-chains;

- a first adder for summing contributions from a plurality of first multipliers in said plurality of first signal processing sub-chains and for feeding said delay block;

a second adder for summing contributions from a plurality of second multipliers in said plurality of second signal processing sub-chains and for feeding said Hilbert transform block; and

a subtracter for subtracting the signal processed by said Hilbert transform block from the signal processed by said delay block, thus obtaining a weighted digital intermediate frequency signal.

32. (New) A base transceiver station in a mobile communication network comprising a system for performing digital beam forming on the radiation pattern of an array antenna according to claim 24.

33. (New) The base transceiver station according to claim 32, comprising a central unit and an antenna unit, said antenna unit being connected to said central unit by means of a link, wherein said system for performing digital beam forming is located within said antenna unit.

34. (New) The base transceiver station according to claim 33, wherein said link is an optical fibre cable.

35. (New) The base transceiver station according to claim 32, comprising a central unit and an antenna unit, said antenna unit being connected to said central unit by means of a link, wherein said system for performing digital beam forming is located within said central unit.

36. (New) A computer program product loadable in the memory of at least one computer and comprising software code portions capable of performing the steps of the method of claim 19.